InterspecieS

Summer 2003

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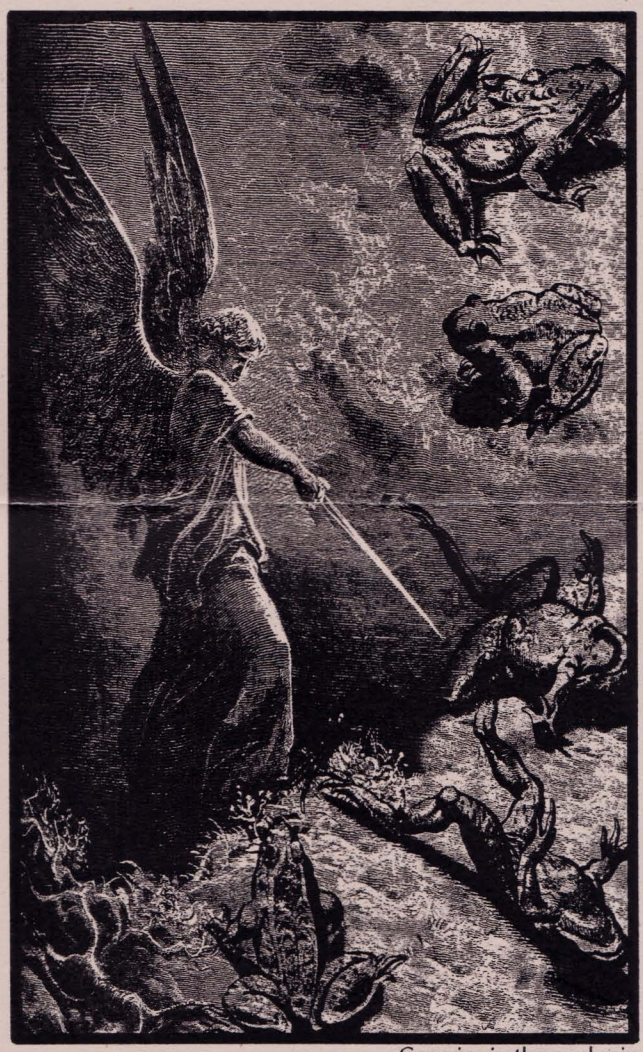
Summer is Interspecies' busy season. I have just returned from a two week trip to Berlin, headlining an event at a grand theater with a 100 foot tall roof in the shape of a lotus flower. The show was produced to draw attention to the annual meeting of the International Whaling Commission which was occuring in Berlin at that moment. Five presentations focused on US Navy and NATO's sonar technologies that are killing whales and dolphins in all the world's oceans at an alarming rate. After the speakers finished presenting gruesome facts, I gave a brief 20 minute presentation about the communication research of interspecies.com. I then retreated to an adjoining theater, actually the world's only underwater performance venue, to do a two hour performance to IWC delegates, activists, and whale lovers. My music was your basic techno trance loops, (ask a teenager to explain it) composed of 100% underwater creature audio samples, not only whale songs and dolphin whistles, but fish croaks, shrimp clicks, lobster bloops, and seal spirals.

Home for just two days, I'm already busy again, this time preparing for a July film shoot with a gargantuan pod of very friendly Pacific white-sided dolphins that resides off the northern tip of Vancouver Island. The film focuses on the controversial subject of animal language, and is produced by National Geographic. I will be starring in my usual nature film role as merman provocateur, providing a wild and interactive musical counterweight to the controlling, concrete-pool mindset of cognitive scientists. Expect a full report in the fall newsletter.

—your trusty editor



Canaries in the coal mine

Musical Frogs

Scientists studying the mating calls of a tree frog from Borneo have discovered that male frogs tune the pitch of their calls to resonate inside hollow trees. The researchers have likened the resonant effects to those of organ pipes. When successful, male frogs sound closer, louder, and presumably more attractive to prospective female mates. Researchers also found that males will expend extra energy on their mating call—increasing the tempo and prolonging the duration of each call—to take advantage of the favorable acoustics.

The discovery marks the first time an animal species has been shown to alter its call to exploit resonant effects. Some species of burrowing frogs and crickets are known to dig burrows or cut baffles in leaves to specific dimensions to create a resonant effect for their mating calls. But such adaptations involve the insect or animal changing their physical environment, not altering their individual calling behavior.

Since such behavior was not previously known to science, researchers have rarely looked for such traits in animals. The findings raise the possibility that similar overlooked animal behaviors await discovery. One researcher has asked, "How common is this phenomenon? Could it be that other animals are using signals in more complex ways to exploit the physics of the environment in which they live?"

Analysis of field recordings demonstrated that when male tree-hole frogs colonize a new hole, they emit a series of calls to "sample" the acoustic properties of the space. With each successive call, the frog adjusts his call pitch to increase the volume it hears inside a tree hole. Male frogs eventually reach the resonant frequency of the space if it lies within reach of their individual vocal range.

If resonance is gained, the male frog reaps a benefit. During their experiment, researchers Lardner and bin Lakim found that the male frog increased the volume of its mating call by 10 to 15 decibels by leveraging the resonant frequency of the tube.

"By exploiting resonance, male frogs appear to be closer and probably more attractive to the female," said Lardner. "Not only will they be heard from a longer distance and attract females from a longer distance, but presumably, the female appreciates a powerful, strong call as a sexy trait that indicates a powerful male." The researchers also found that when they drained water from one of the tree cavities, a male frog changed the pitch of his mating call by 115 hertz just to stay within the resonant frequency of the space.

The vocal range of individual male tree-hole frogs vary, much like humans. Natural tree hole habitats also vary in shape, size, and resonant frequency. Luck therefore plays a role in whether or not individual male frogs can gain resonance in a given hole.

When male frogs do find a tree hole with resonant frequencies that lie within their vocal range, they pull out all the stops, Lardner said, increasing the calling rate and pulse duration of their mating calls.

Good News Travels Fast

from: Nanami
To: Cathy Williamson of WDCS

I will tell you some good news from Futo.

Mr. Ishii, ex-dolphin hunter and now the owner of the first dolphin watching business in this part of Japan, told me that in the beginning of March, Futo fishermen visited the National Fisheries Agency to report that they will not conduct their usual dolphin hunt for this season.

A few days later, a pod of 300 to 400 striped dolphin came close to Futo bay. Mr. Ishii said that he thought they must know that the hunt is over since it has been more than 10 years since he had seen such a big pod of striped dolphins near Futo.

Bird Policy Lays an Egg

While attempting to counter an activists' efforts to stop bombing exercises on a tiny Pacific island, The US Navy showed dubious creativity while marshalling their legal argument.

In federal court, a Mariana's bird-watcher named Ralph Frew, testified that the resulting reduction in the bird population diminished his own bird-watching hobby. He pointed out that the Navy had not secured a permit from the U.S. Fish and Wildlife Service and, therefore was violating the Migratory Bird Treaty Act.

The Navy said it had to keep using 200-acre Farallon de Medinilla Island, near Saipan, because it was the only available range in the Pacific. U.S. District Judge Emmet G. Sullivan agreed on the critical importance of the Navy exercises, but then asked why they needed that particular island.

First, the Navy said, using the island as a live-fire range is actually beneficial to the birds because it stops people from getting on the island and harming them. Judge Sullivan agreed that people do tend to avoid going anywhere where the military is dropping bombs,then airily dismissed the claim as "surprising."

He also rejected the Navy's second argument that Frew didn't show sufficient injury from the bombing. "In some respects," said the Navy lawyer, "bird-watchers get more enjoyment spotting a rare bird than they do spotting a common one."

Sullivan then paraphrased the essential argument as "the more birds the Navy kills, the more enjoyment Mr. Frew will get

from seeing the ones that remain. As long as theNavy doesn't cross the fine line between 'rare' and 'extinct', the bird-watchers should be delighted."

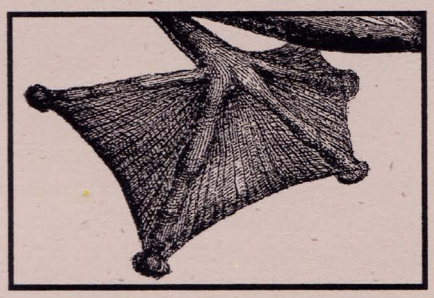
Sullivan ultimately sided with Mr. Frew by declaring the exercises illegal.

Elephant Compassion

Near Empagani, South Africa, the matriarch of a herd of elephants opened a gate with her trunk to free antelopes being held for slaughter. Lawrence Anthony told the SAPA news agency Tuesday that a private game capture company had rounded up the antelopes to relocate them for a breeding program. The crew was settling in for the night when the herd of 11 elephants approached, he said.

"They circled the enclosure while the capture team watched warily, thinking the herd was after the alfalfa used to feed the antelope," he said. The herd's matriarch, named Nana, approached the enclosure gates and began tampering with the metal latches holding the gates closed. She carefully undid all the latches with her trunk, swung the gate open and stood back with her herd.

"At this stage the onlookers realized this was not a mission for free food, but a rescue," Anthony said. The herd watched the antelope leave the camp and walk off into the night. Ecologist Brendon Whittington-Jones said: "Elephants are naturally inquisitive. But this behavior is most unusual and cannot be explained in scientific terms."



Whales & Sonar

by Bill Rossiter, Cetacean Society International

The September 2002 stranding of Cuvier's beaked whales in the Canary Islands was caused by what human divers call decompression sickness (DCS), or "the bends". Until now the standard belief was that cetaceans couldn't suffer DCS, because they dove deeply with only a small remnant of air in their lungs from their last breath. DCS afflicts human that breathe extra air from tanks while submerged, and then come to the surface without taking enough time to get rid of the nitrogen saturated in their body's tissues. DCS is the result of nitrogen coming out of solution and forming bubbles that expand to disrupt cells, cause loss of function in organs, create embolisms that block circulation, and compress or stretch blood vessels and nerves. DCS in humans has several levels of severity, and by itself is not usually fatal, but it is often crippling.

These stranded whales had evidence of fat embolisms, and "severely disseminated microvascular hemorrhages", which means that they had blood around nerves, eyes and brains, and in their ears, lungs, kidney and spleen. Not every whale had all the symptoms. They might have survived, but thoroughly disoriented and suffering from multiple injuries, they blundered ashore, at least giving the scientists in the Canary Islands the clues to tell us all what happened.

There have been over 20 mass strandings of beaked whales since detailed records began about 1963, which coincides with the time that the first modern sonar systems also appeared. But the connection between strandings and sonar wasn't made clear until an event in Greece in 1996. The great majority of strandings have been Cuvier's beaked whales, but dense beaked whales and other species have been mixed in. After the 2000 stranding in the Bahamas the focus of investigations was on the whales' heads and ears, with implications for hearing and orientation.

Only after the Canaries stranding did the investigations widen to look for evidence of DCS in major organs. Recently, DCS symptoms have been found in stranded Risso's dolphins, common dolphins, and a harbor porpoise, all in the UK. One dolphin's liver looked more like bubble wrap than tissue.

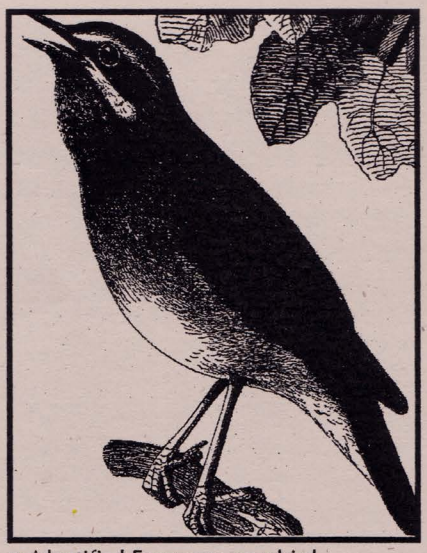
The historical record of cetacean strandings should be reviewed for any correlation with military sonar use before the stranding. A major concern is that even a single beaked whale that strands might implicate sonar impacts on an unknown number of whales over a wide area, only one of which made it to shore. A beaked whale mass stranding can often be of very separated individuals, implying a scattered feeding group where only the closest whales blundered on shore. And could DCS have caused the stranding of the two minke whales involved in the 2000 Bahamas event?

Military sonar is the culprit because there is no evidence so far that Cuvier's beaked whales or any other deep diving cetaceans suffers from DCS naturally, after millions of years of evolving to exploit the deep ocean. Look what happened on that fateful September day in 2002.

Sometime before dawn off the Canary Islands of Fuertaventura and Lanzarote a veritable storm of military sonars were unleashed as the naval exercises began. At least 58 surface vessels, six submarines, and 30 aircraft participated in a mock assault that included assets from several nations, first identified as a NATO maneuver. The strandings began soon after.

The behavior of Cuvier's beaked whales may make them vulnerable to sonar noise. If the whales spent very little time at the surface between dives, dove up and down slowly, stayed very deep as long as possible, and had some air in their lungs during the first 70 meters of the dive, the whales' body tissues would likely become super-saturated with nitrogen. That nitrogen would be even more dangerous if the whales rushed to the surface, perhaps if they were startled. Cuvier's beaked whales have been doing such dives for millions of years, so what was different here?

Suddenly there were multiple military sonars pinging, each sending half second pulses at about 2-3.3 kHz every 24 seconds or so, with source levels perhaps as high as 235dB. Perhaps it was a sudden rhythm or beat, or several waves striking from different directions at once, but something about the way each whale was struck made a terrible difference. The extensive analysis of the sonars and environment that were implicated in the 2000 Bahamas stranding could only conclude that the combined sonars of several ships had been "ducted" by specific water conditions.



unidentified European songbird

What follows is theory only, regard it as questions to be answered.

The disaster may start with the micro-bubbles in the tissues of many deep diving cetaceans. Why don't these nearly microscopic bubbles expand every time a whale surfaces from a deep dive? Or why don't they dissolve? To summarize all the big technical words, that's still a mystery. Perhaps, according to a theory from acoustical physicist Professor John Potter, a protein based non-permeable barrier forms naturally around the micro-bubbles. No one has noticed it, but has anyone looked for it? Whatever usually keeps these micro-bubbles stable may have protected cetaceans from naturally occurring DCS for the millions of years they've exploited very deep habitats.

So, if the sounds from multiple midrange military sonar were manipulated by certain water conditions and struck an ascending whale with extremely saturated tissues, the micro-bubbles might pulse enough so that their gas-impermeable wall cracked. As the wall broke up after the initial expansion, the bubbles' size would multiply rapidly by static diffusion and cause significant damage in a very short time. Another process, called rectified diffusion, could also explain the bubble's expansion. Levels of sound over 210dB would be required even for supersaturated tissues. For a measure of this volume, consider that the US Navy immediately ceases all sonar if there are humans in the water at 180 dB. Since dB is a logarithmic measurement, 180 dB is nearly a million times less loud than what occurred in the Canaries.

It's very important to recognize that the received level of sound that initiated the bubble's expansion might have been only 140dB or even less, far below the often-used 180dB level officially considered to be the threshold of injury. Until the full picture of this complicated event can be documented no one can say what really is a safe level of sound. But there should be no question that relatively low levels of sonar sounds under certain conditions cause DCS in cetaceans.

There are a lot of questions that have to be answered before the threat of sonar can be reduced. Even if operational changes are made to lessen the chance of impacting whales, such as avoiding likely beaked whale habitats or with pauses giving them a chance to escape, the world's navies will demand proof. Even then the political will needed to force the military to stop crippling whales with sonar may need very dramatic proof.

There are many other questions that reasonable people must ask about the harm human noise does in the oceans. Without answers managing and mitigating that noise is only guesswork, without the facts to support whatever solutions are proposed or required. Adequate and appropriate science must provide those facts. But at this moment research that would use sound on live, wild cetaceans has almost stopped, particularly in the US. In January a lawsuit succeeded in stopping a project designed to see if whales could be located with sonar. Earlier a seismic survey implicated in the deaths of two beaked whales refused to stop until a judge ruled that it must. Funding agencies watched as the research teams idled and the resources, money and time vanished. Suddenly legal challenges have become a major obstacle to future research.

The sonar lawsuit found that NOAA Fisheries had failed to meet the obligations of the National Environmental Policy Act (NEPA), by amending a 2000 permit three times, adding oceans, species,

Singing Bellbird

noises, and purposes, all without a public assessment of impacts. The judge stopped short of actually opening the U.S. Marine Mammal Protection Act, but it was there.

The fundamental motivation to legally challenge noise research today is the perception that the research will do harm. The plaintiffs in the sonar lawsuit were motivated first to stop the project for the ethical and moral reasons; they believed it would harm migrating gray whales, some pregnant, some newborn calves. Empowered by these recent court decisions, frustrated by government slackness and scientific silence, more whale advocates today stand ready to oppose any acoustical research on live cetaceans. It's a matter of trust.

Advocates may agree that science is about finding facts, that those facts can prove the harm done by human noise, and that advocates can use that proof to win back protections. But, after too many frustrating examples they simply don't trust scientists or agencies in general, because of several perceptions:

First, that the conclusions from a project may be biased in favor of the funder. It is a fact that very few U.S. scientists that receive funding from the US Navy's Office of Noise Research have made any public comments of concern about military sonar, like the LFAS, while many, many scientists elsewhere, not caring about ONR funding, have been very vocal. ONR rejects the notion of such influence, but many scientists admit to it. Other major funding sources are perceived to have similar influence.

Second, that scientists are willing to harm cetaceans in order to get results. Some are, but most are not. But advocates believe that scientists have lost sight of why they started in the first place, and now look at the world as if it was all organic machines and chemicals, a source of funding, publications and tenure. Scientists see advocates as too subjective and emotional, selecting what to believe even if it has no basis in fact. They often don't know how to talk to each other, even if they wanted to.

Third, scientists can be very reluctant to express an opinion without empirical proof. They qualify every comment, just to make sure. Yet, as experts, they are expected by advocates to have opinions, and to be willing to show that they care enough because they know enough. Scientists should feel free to express their opinions, but many feel constrained by peer pressure to stay detached.

Fourth, scientists and regulators don't communicate clearly with the public. Terms like "biologically significant impacts", "population level events", "biological relevance", or "controlled exposure experiments" may be useful in professional contexts, but they don't work when advocates just want to know when whales and dolphins are being harmed and what responsible people are doing about it. For example, while "controlled exposure experiments" are used to explore the potential for noise to have harmful effects on marine mammals by making noises, they do not often publicly assess and minimize the risk that the experiments themselves may harm their subjects. That's enough to turn most advocates towards legal solutions.

Reasonable people can usually communicate if they can define a common goal, and if they care to try. At this moment, without diverse stakeholders trying to communicate, cetaceans are in increasing danger, because the noise is increasing whether we talk about it or not. Some people are trying informally to bring these very diverse stakeholders together, with an acceptable risk of being misunderstood by both sides. Unless the advocates and scientists make an effort to get together the agencies and politicians that decide the laws and policies will continue with their guesswork, and without facts to prevent them from asserting self-interests the laws protecting and conserving the environment will become worthless to all but those who want to abuse it.

Tuning in a Deep Sea Monster

Scientists have revealed a mysterious recording that they say could be the sound of a giant beast lurking in the depths of the ocean. They have nicknamed the strange unidentified sound picked up by undersea microphones "Bloop." While it bears the varying frequency hallmark of marine animals, it is far more powerful than the calls made by any creature known on Earth, Britain's New Scientist reported on Thursday. It is too big for a whale.

One theory is that it is a deep sea monster, possibly an unknown species of giant squid. Although dead giant squid have been washed up on beaches, and telltale sucker marks have been seen on whales, there has never been a confirmed sighting of one of the

elusive cephalopods in the wild. The largest dead squid on record measured about 60ft including the length of its tentacles, but no one knows how big the creatures might grow. For years sailors have told tales of monsters of the deep including the huge, many-tentacled kraken that could reach as high as a ship's mainmast and sink the biggest ships.

Phil Lobel, a biologist at Boston University, Massachusetts, doubts that giant squid are the source of Bloop. "Cephalopods have no gas-filled sac, so they have no way to make that type of noise," he said. "Though you can never rule anything out completely, I doubt it."

Nevertheless he agrees that the sound is most likely to be biological in origin.

In the 1960s the U.S. Navy set up an array of hydrophones, around the globe to track Soviet submarines. The network was known as SOSUS, short for Sound Surveillance System. The listening stations lie hundreds of yards below the ocean surface, at a depth where sound waves become trapped in a layer of water known as the "deep sound channel". Here temperature and pressure cause sound waves to keep travelling without being scattered by the ocean surface or bottom.

Most of the sounds detected obviously emanate from whales, ships or earthquakes, but some very low frequency noises have proved baffling. Scientist Christopher Fox of the U.S. National Oceanic and Atmospheric Administration's Acoustic Monitoring Project at Portland, Oregon, has given the signals names such as Train, Whistle, Slow-down, Upsweep and even Gregorian Chant. Upsweep, for one example, was tracked to an undersea South Pacific mountain that had not previously been identified as live. "The sound waves are almost like voice prints. You're able to look at the characteristics of the sound and say: 'There's a blue whale, there's a fin whale, there's a boat, there's a humpback whale and here comes anearthquake," he says.

But, he says, some sounds remain a mystery; like Bloop, first detected by sensors 3,000 miles apart in 1997, and still unexplained.

Making Bird Music

From: Rene Van Peer
<100614.2750@compuserve.com>
To: Jim Nollman
<beluga@rockisland.com>

Dear Jim, We have been in contact some years ago when I was doing an article in the US based magazine Experimental Musical Instruments. I send you a text that I wrote recently as a response to an inadequate review of a CD of the Maciunas Ensemble in EMI magazine.

Dear Editor,

Having read Mitchell Clark's review of ***Live with the Birds of the Maciunas Ensemble*** (Apollo Records ACD 129615), I feel called upon to make some additional remarks in connection with the contents. In the liner notes to this album a letter is quoted in which ensemble member Paul Panhuysen describes the circumstances of this sonic coming together.

"The studio where the recording is made is the same room where the birds live in their aviary. The birds were so inspired by the sound of the aluminium strips, that they immediately joined the music as improvising musicians and continued to play with us in an often very loud and competitive way for more than an hour. The birds stopped only after we had stopped. The event was not planned, it just happened."

Birds that sing are alert to the sounds around them. The more complex their song, the more sophisticated they are in responding to such sounds. This is especially evident in species that use mimicking in their song, such as the Lyrebird, the Mocking Bird, and the European Blackbird Thrush. Other, less proficient, song birds may adapt to extraneous sounds by spacing their vocalizations around them, thus contributing to the complexity of a polyvocal chorus.

Ornithologists have recognized this way of structuring songs only quite recently, because it comes dangerously close to (or perhaps even ventures into) taboo area, as it seems to suggest that, in their song, birds make conscious choices, thus transcending a dumb following of instinct. To hear birds do this in their natural surroundings is wonderful. It is part of the beauty of the dawn chorus. But to hear them do it in a manmade environment and in a musical context is downright astounding. It is what happened when the Maciunas Ensemble played their aluminium strips. Incited by the complexity and richness of the instruments the birds in the aviary joined in.

This is not entirely unheard of. Jim Nollman has played music to a variety of animals, stimulating them into response. In Afghanistan, rubab players often take a caged canary with them on stage; from time to time during the concert the bird will sing with the music, a pinnacle of aesthetic and spiritual beauty, according to the Afghan audience. Examples of this can be found on ***The Rubab of Herat***, VDE-Gallo CD-699, recorded by John Baily.

Whereas Nollman has apparently tailored his music so as to secure a response from the targeted animals, what happened to the Maciunas Ensemble is more similar to the Afghan situation. There people will play their usual repertoire. It is the rich timbral resonance of the instru-

ment, due in part to a considerable number of sympathetic strings, that sets the birds singing. But although this Afghan music and the bird's song may be directly related on one level, they exist side by side rather than interact.

The Maciunas Ensemble however established a reciprocal relationship with the birds through their music. it was unintentional, but effective. It is based on the recording that was made of the event, represented by two long tracks in which the role of the two groups are reversed, as is expressed in the titles: ***Man and Bird*** and ***Bird and Man***. The reciprocal relationship is based on the structure that either or both groups can take the lead, but also by the way the birds match their voices to the sounds generated by the Maciunas Ensemble.

That is what makes this CD unique. The birds do actually play with the open and rich sound structures, fitting their warbles, chirps and cheeps to the pitches and rhythms coaxed from the aluminium strips. And they do take the musicians into new directions by the power of their presence.

These two tracks have insightfully been complemented with two tracks that feature both groups separately, allowing the listener the possibility to assess what one sounds like without the other, and how their coming together added something of unique significance to the repertoire of both.

Yours Truly,
Rene van Peer

An Interspecies project:

Whale Techno

Techno music is one of the most popular musical forms of the day. It is appropriately named, computer based, and overwhelmingly dependent on software for sampling, modulating, and looping. This basis tends to liberate the very idea of making music as the exclusive domain of instrumentalists and singers. In that regard, the genre holds the intriguing potential to democratize the making of music. Anyone with the necessary virtual instruments, can create, record, and distribute passable techno music. As always, patience and perseverance furthers.

Most *au courant* techno music finds it source material in other recorded music, which is sampled, synthesized, layered, and re-sampled. Despite the music industry's emphasis, any sound can be used to compose and construct music that fits the techno form. The possibilities are endless.

We propose an alternative source material, one that better fits the earth-based aesthetic of the two sponsoring organizations, **Interspecies.com** and **Greenmuseum.org**.

Interspecies possesses a unique audio library on DAT and cassette, consisting of whale and other underwater critter sounds, recorded over 20 years time. This includes, beluga whales, orcas, several species of dolphin, cachalot, gray whale, lobsters, seahorses, several seal species, walrus, so forth and so on. In the case of orcas, dolphins and belugas, the animals can be heard in live, real time interaction with many different musicians, children, and even Tibetan Lamas reciting their prayers.

Interspecies begins a project this summer to glean a CDs worth of audio samples from this library. Let's add a spoken poem, a recorded song lyric, or a documented presentation to add some spoken context, then distribute each sample CD to ten computer musicians, including the famous and the unknown. Each composer will be asked to create a 2-7 minute piece. Interspecies and GreenMuseum will publish and distribute the music over both of their well-established websites.

The first stage includes:

1. Searching the interspecies library and collecting samples
2. Burning the samples onto a master CD as a collection of individual .wav and .aif files.
3. Print a simple cover, and insert an index of the samples.
4. Deliver copies to interspecies and greenmuseum.

The second stage involves the two sponsoring organizations to seek out and invite musicians around the world to compose pieces using this sampled material.

The third stage begins when a full CD worth of compositions are complete, and fundraising begins for Interspecies and greenmuseum to produce a CD of songs, and place them in a gallery on either or both websites.

The fourth stage, involves the production of a swimming pool concert to present this material to a live audience, possibly in San Francisco.